

(12) **United States Patent**  
**Gavin**

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- (54) **T-HOUSING FOR SEPTIC TANK**
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- (22) Filed: **Feb. 10, 2005**

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#### Related U.S. Application Data

- (60) Provisional application No. 60/545,099, filed on Feb. 17, 2004.
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**B01D 29/35** (2006.01)  
**B01D 35/027** (2006.01)  
**F16L 5/00** (2006.01)  
**C02F 3/28** (2006.01)
- (52) **U.S. Cl.**  
CPC ..... **B01D 35/027** (2013.01); **F16L 5/00** (2013.01); **B01D 29/23** (2013.01); **B01D 29/35** (2013.01); **C02F 3/288** (2013.01)
- (58) **Field of Classification Search**  
USPC ..... 210/282, 237, 236, 172.6, 453, 447, 210/448, 449, 484, 462; 220/301, 300, 326, 220/345.3, 302; 72/402, 730, 399  
See application file for complete search history.

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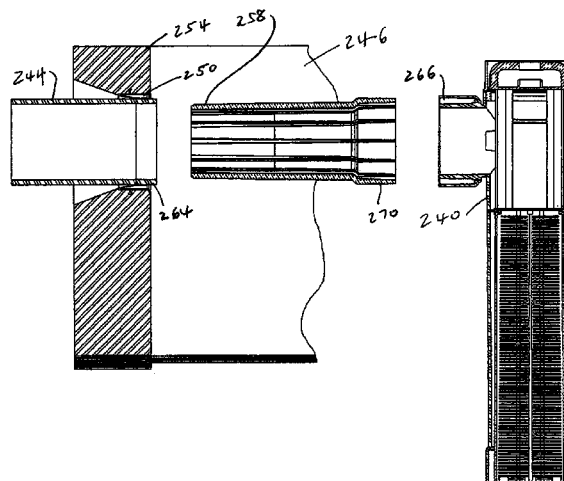
*Primary Examiner* — Benjamin Kurtz

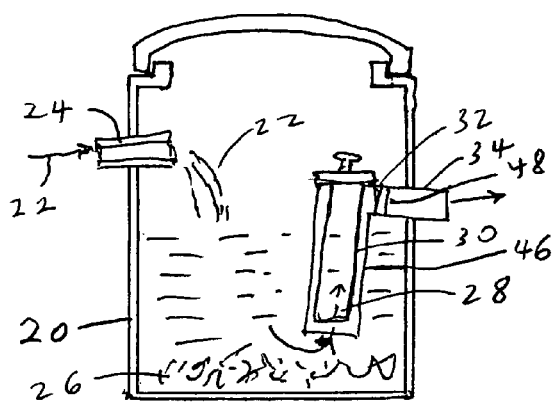
(74) *Attorney, Agent, or Firm* — Wiggin and Dana LLP; Anthony P. Gangemi

#### (57) ABSTRACT

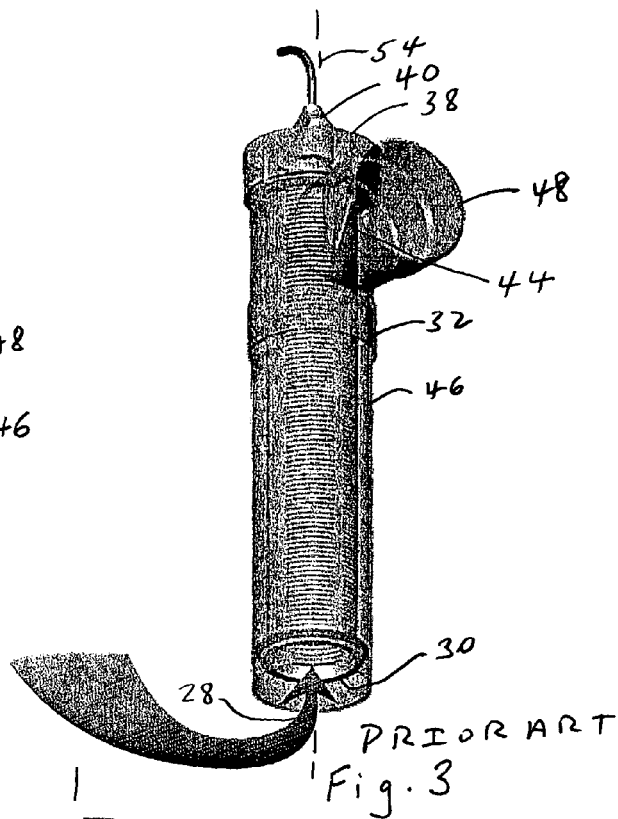
The bottom annular end of a vertical collar that extends into the vertical tubular portion of a T-housing and is fastened therein by resilient fingers extending radially outward from the collar, is contacted by a resilient finger of a filter inserted through the collar into the tubular portion, a radially inward extending shoulder in the collar is contacted by the bottom of an annular horizontal plate on the filter, and a liquid level alarm system housing is attached to the outer surface of the vertical tubular portion by a plurality of vertically spaced apart catches or studs received in slots on the alarm system housing, a tapered pipe having a first end fastened to a horizontal exit joint on the T-housing and a second tapered end force fit into an exit pipe of a septic tank.

**2 Claims, 19 Drawing Sheets**

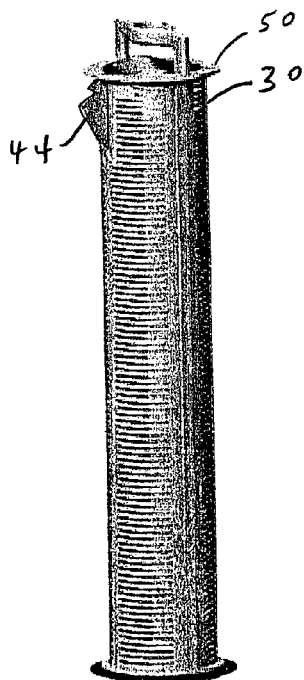




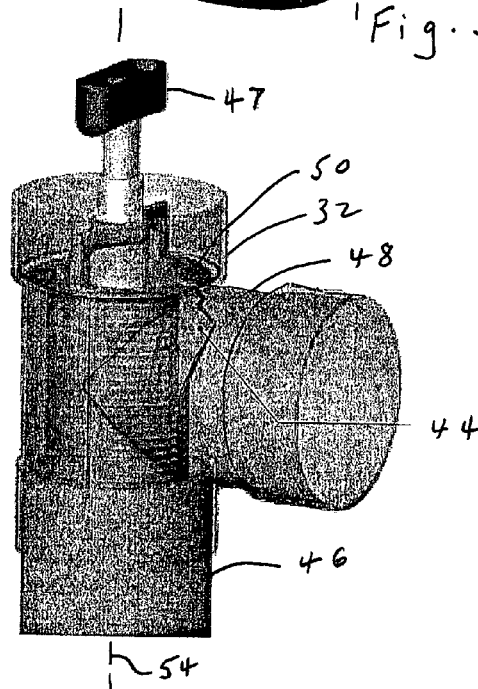
PRIOR ART  
Fig. 1



PRIOR ART  
Fig. 3



PRIOR ART  
Fig. 2



PRIOR ART  
Fig. 4

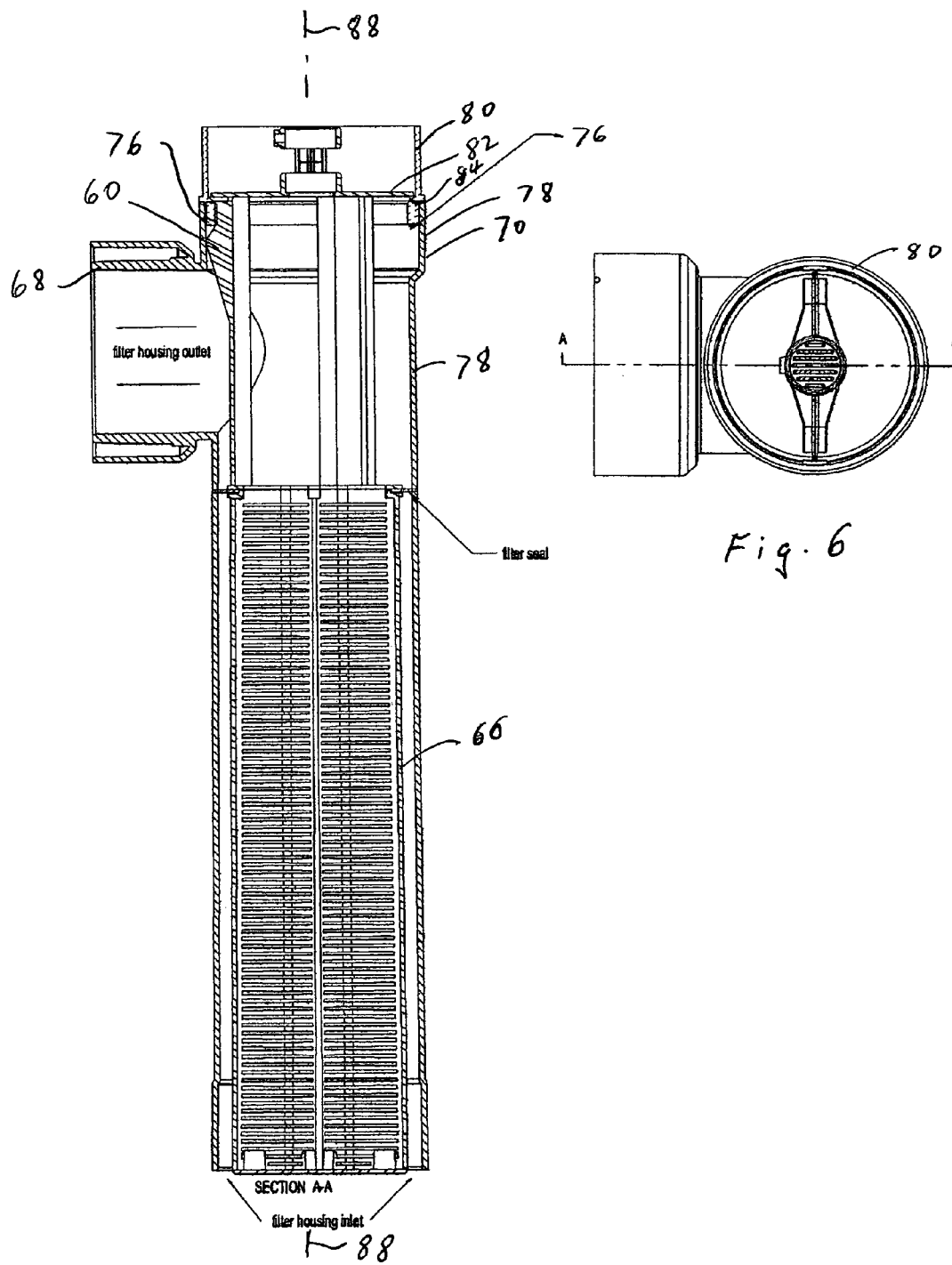


Fig. 6

Fig. 5

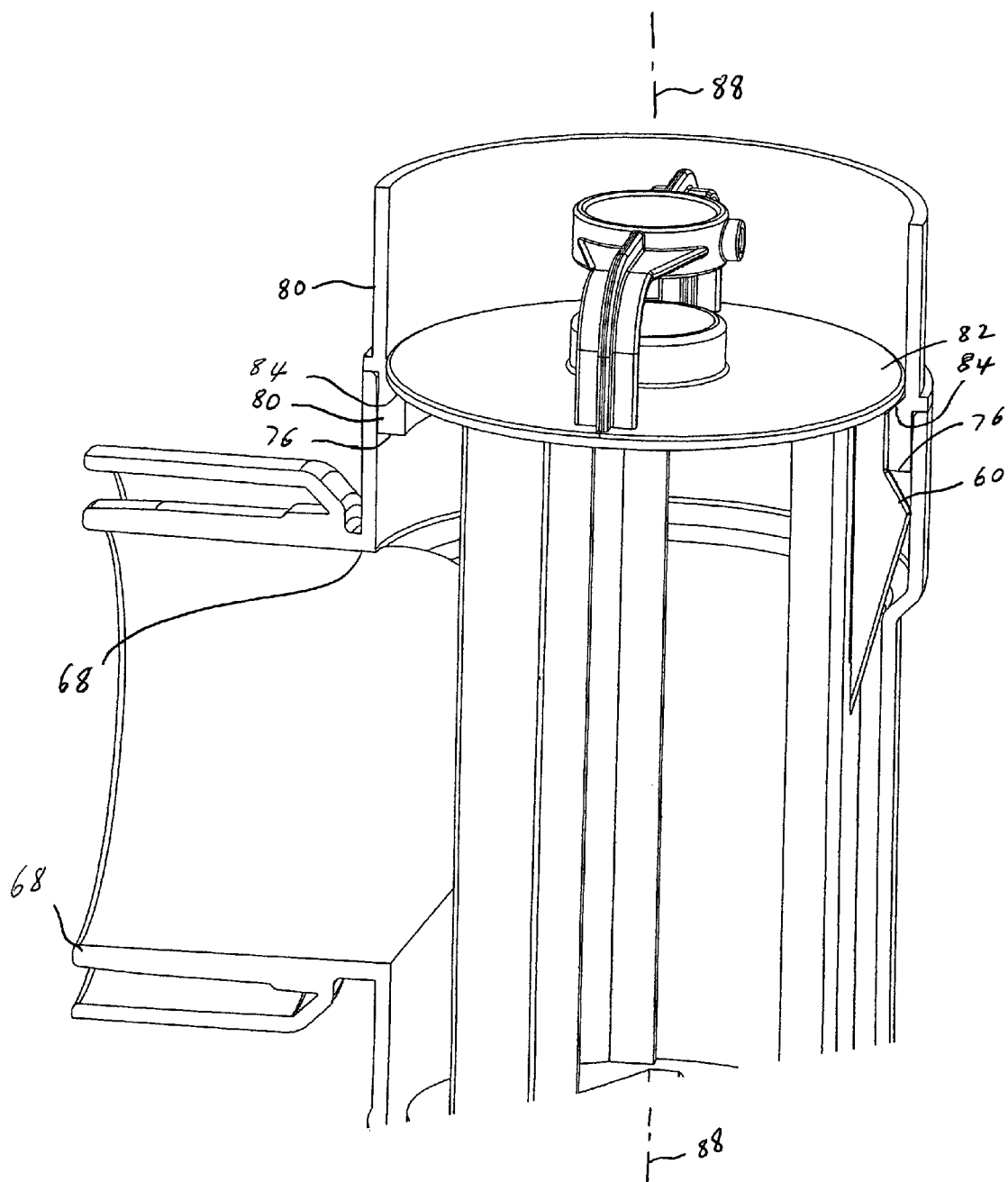


Fig. 7

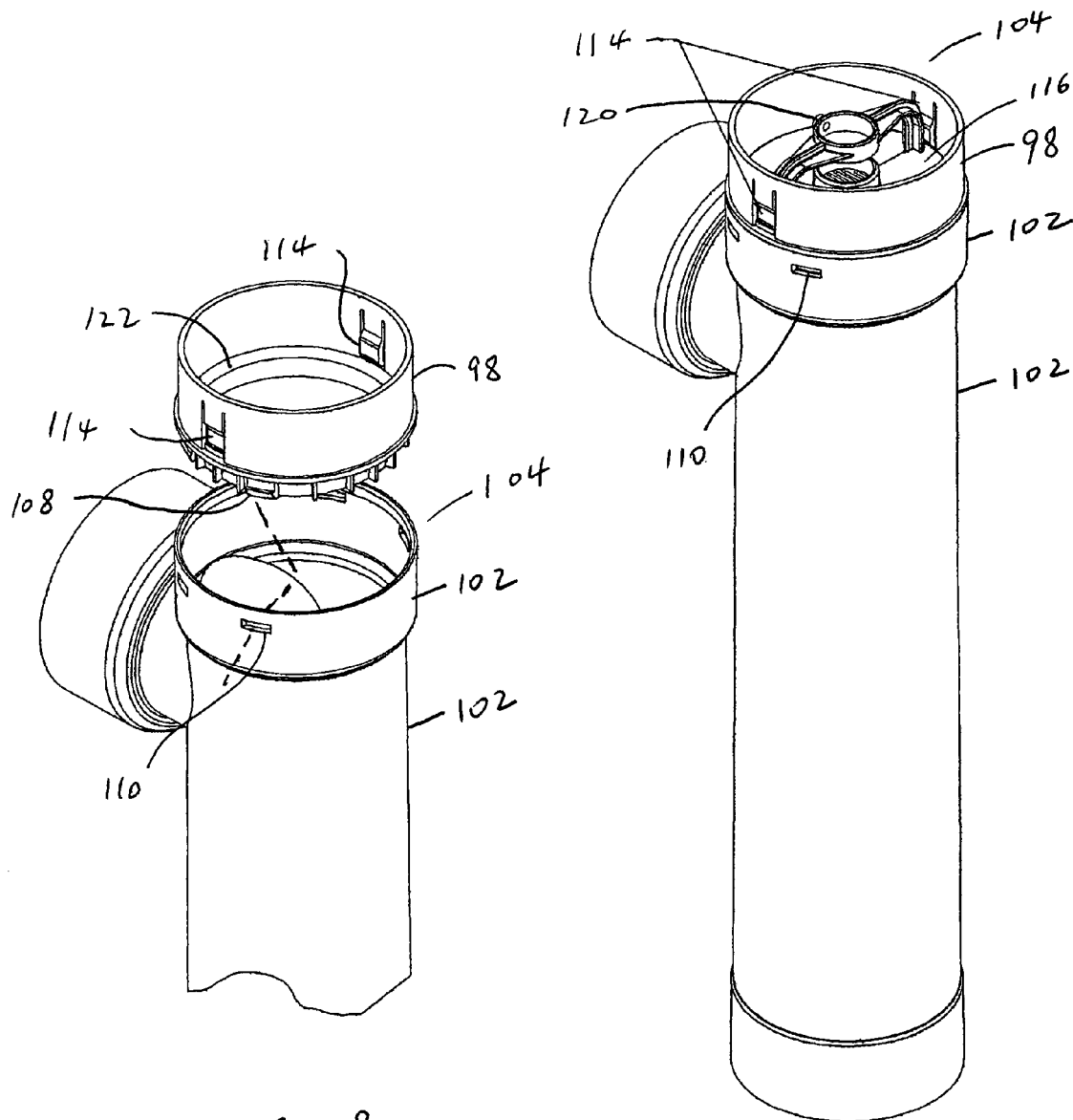
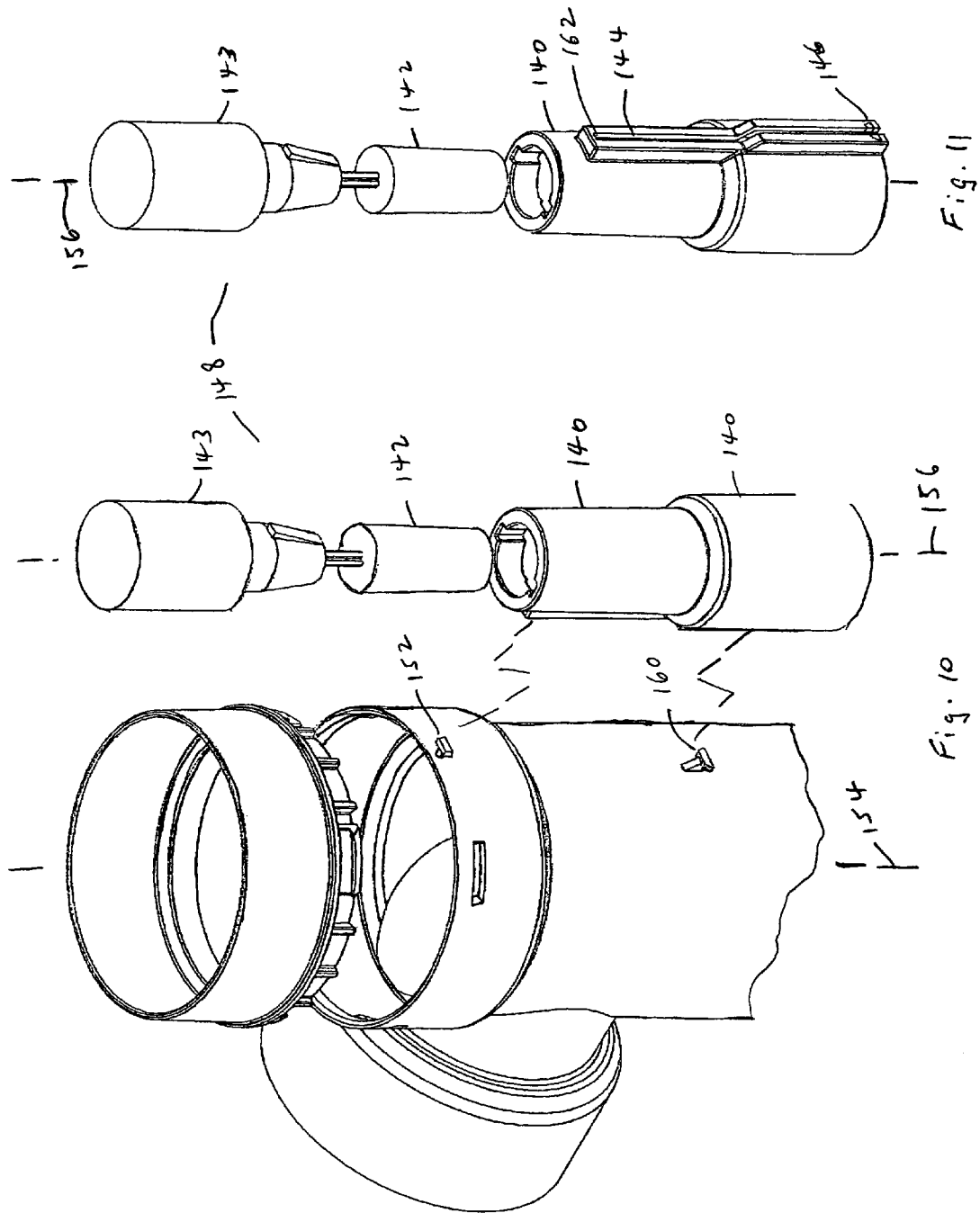


Fig. 8

Fig. 9



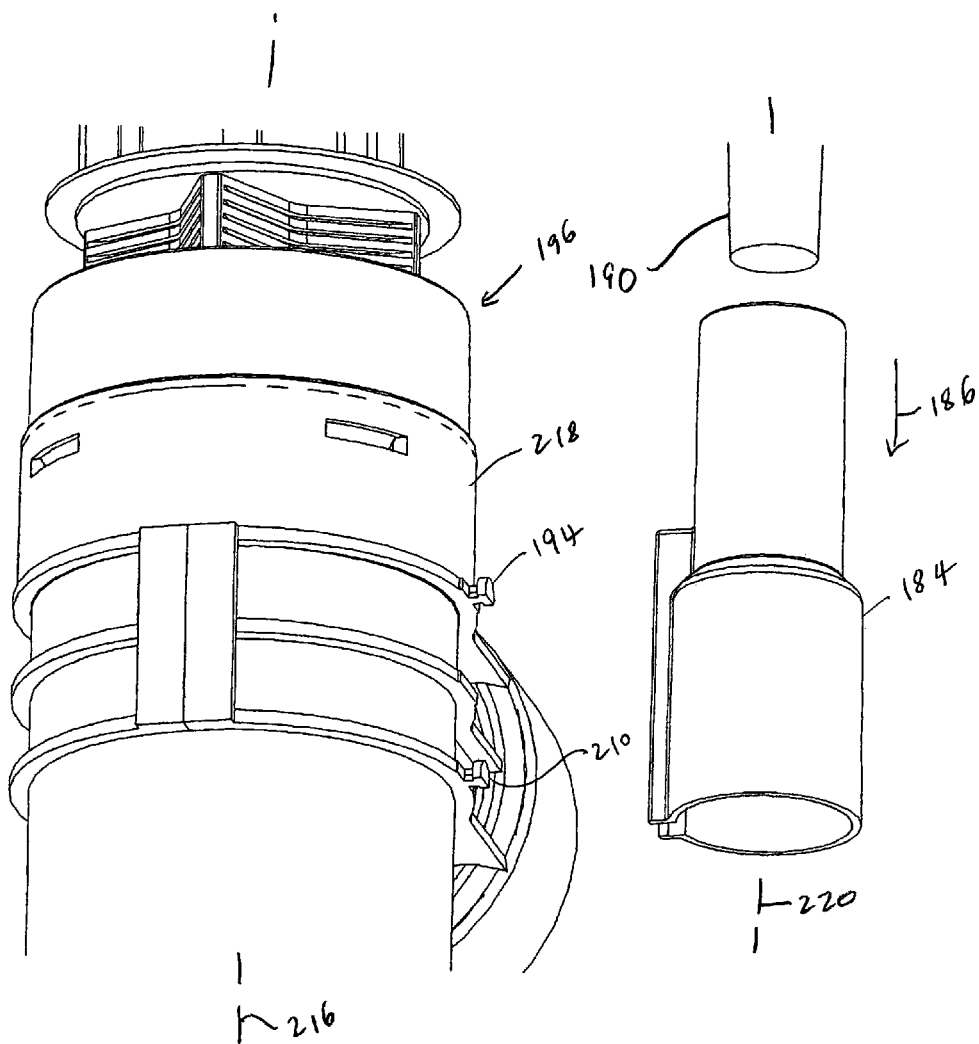


Fig. 12

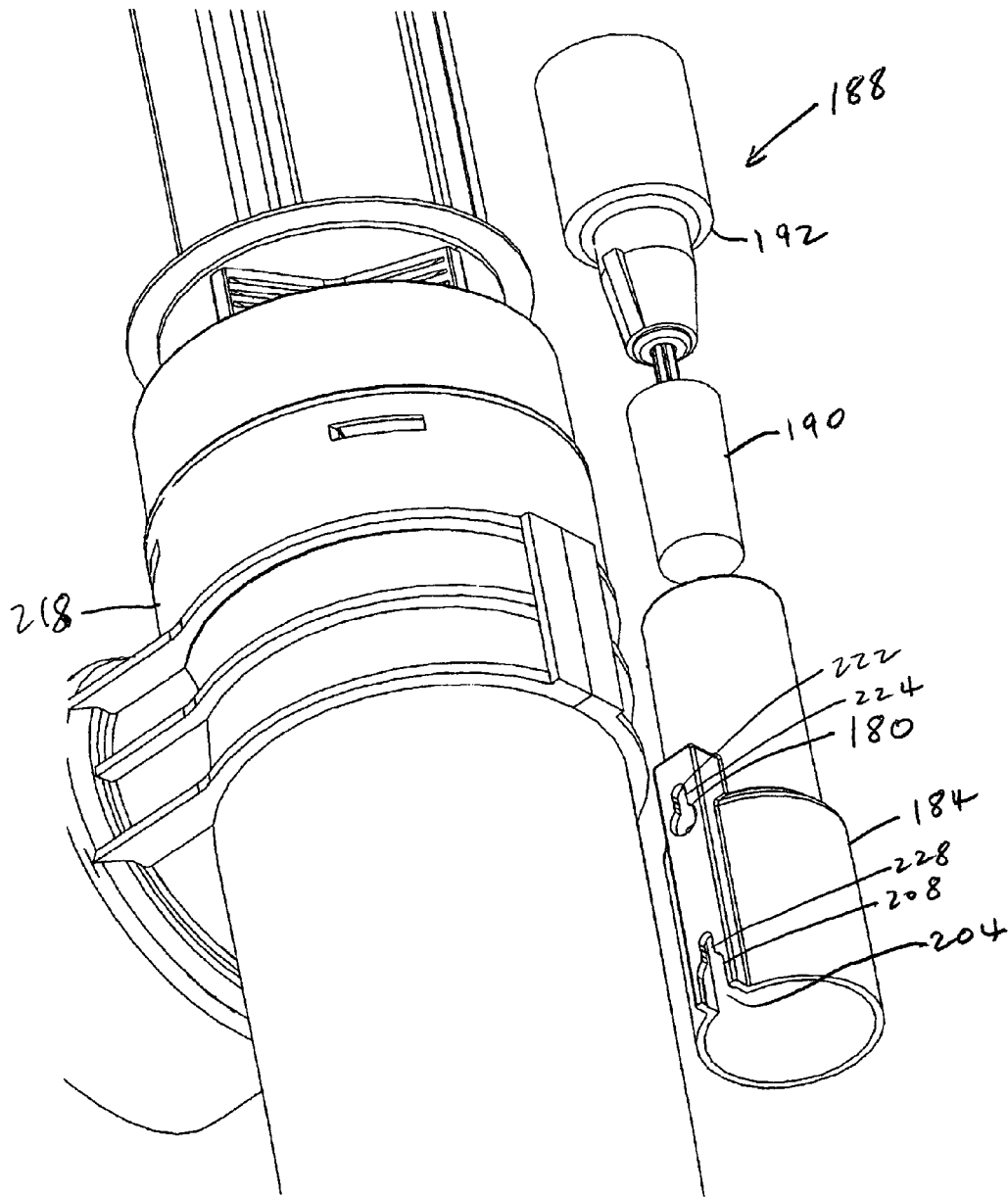


Fig. 13

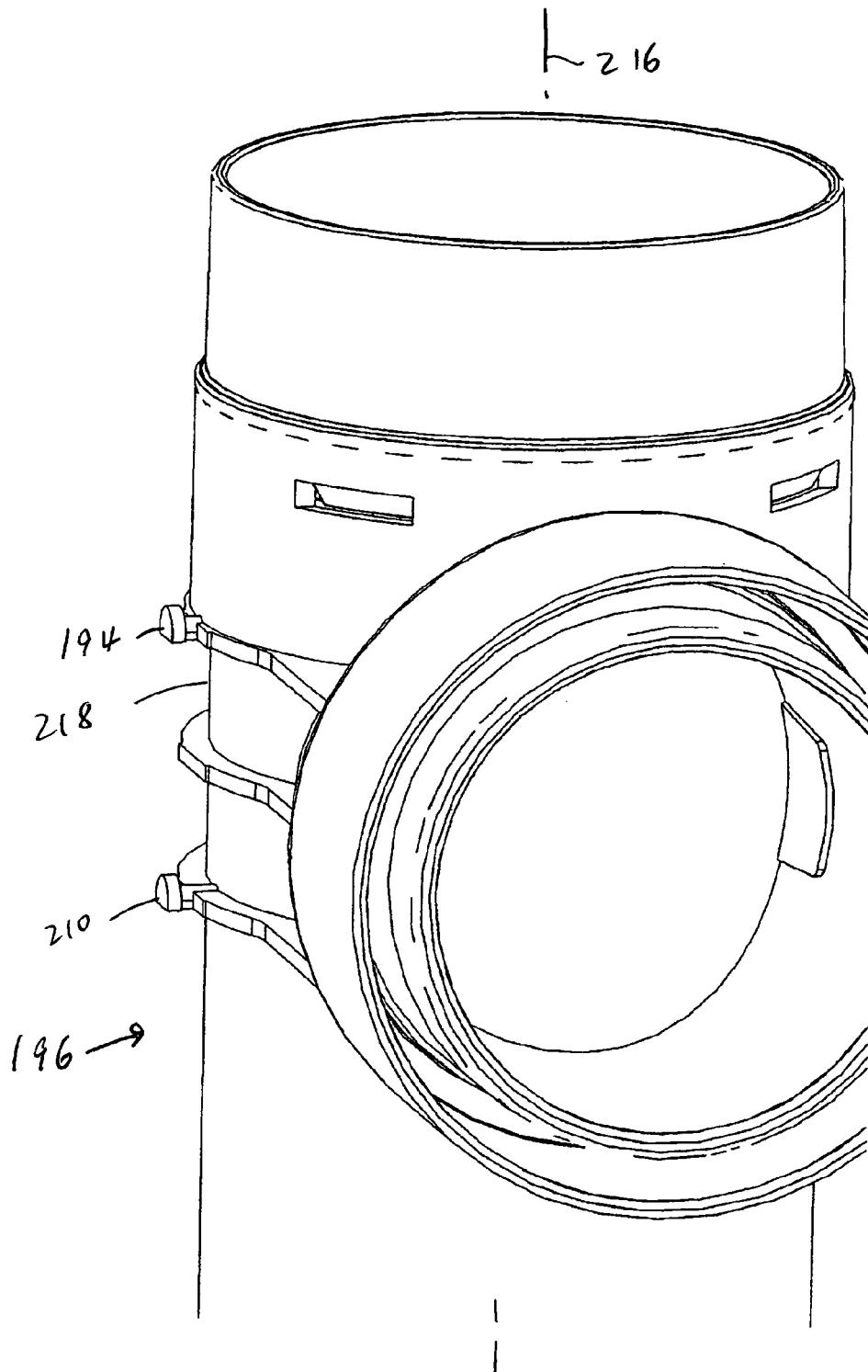


Fig. 14

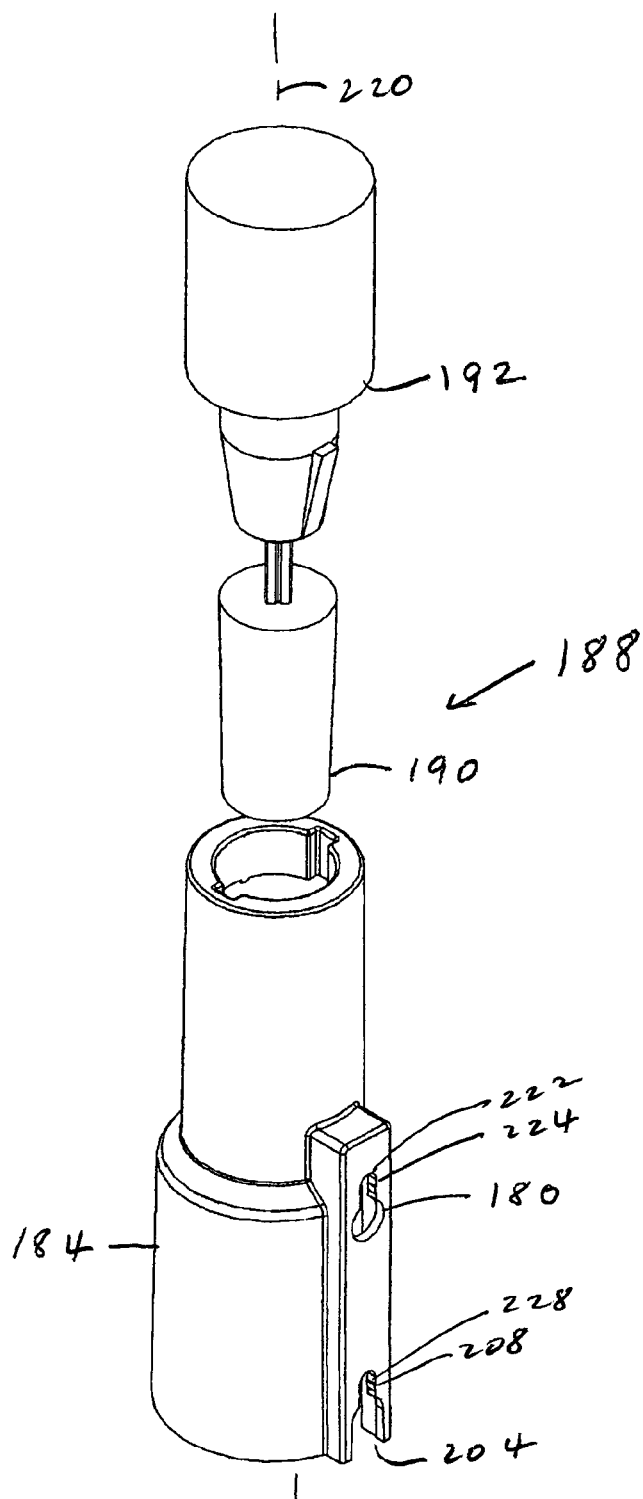


Fig. 15

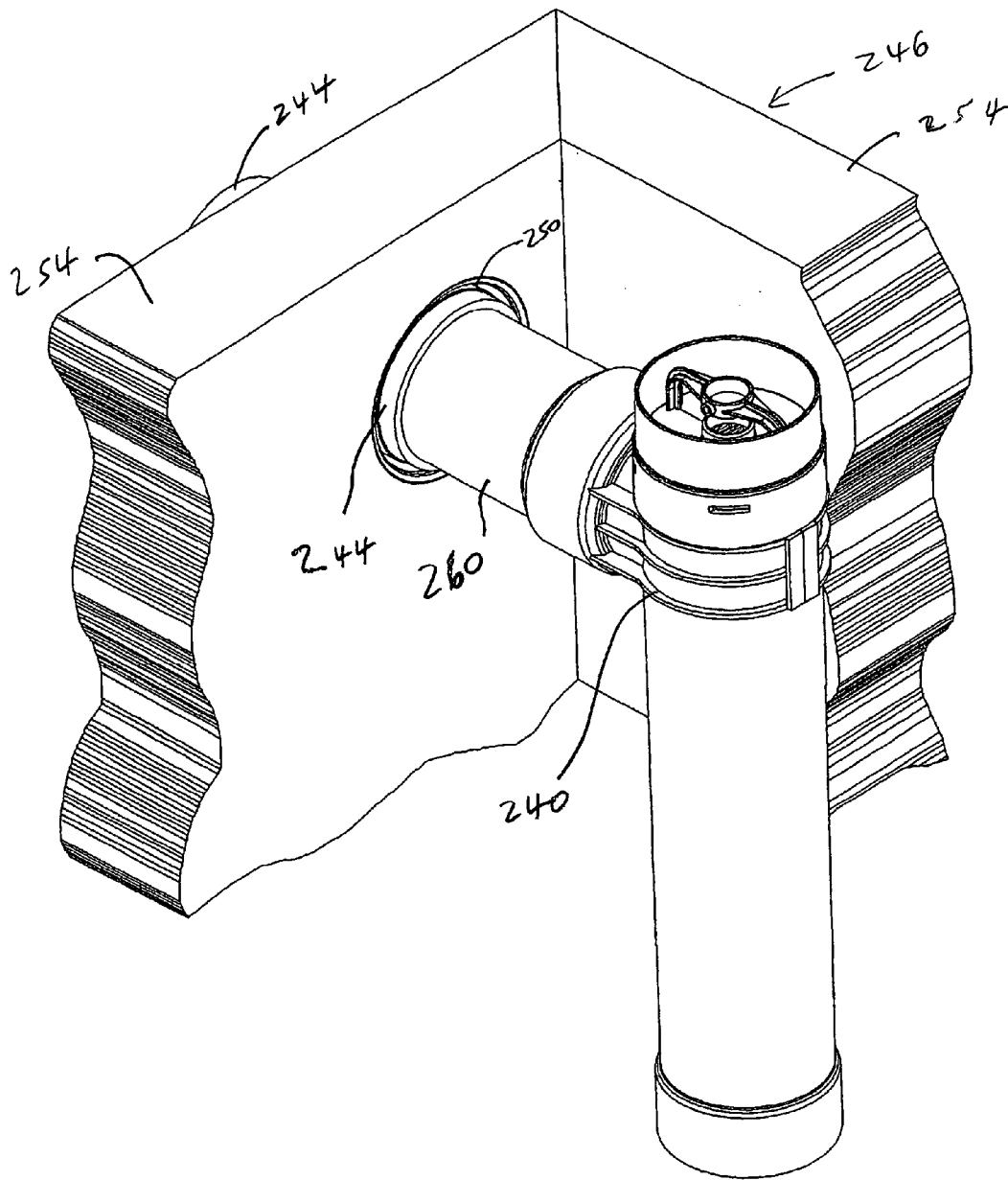


Fig. 16

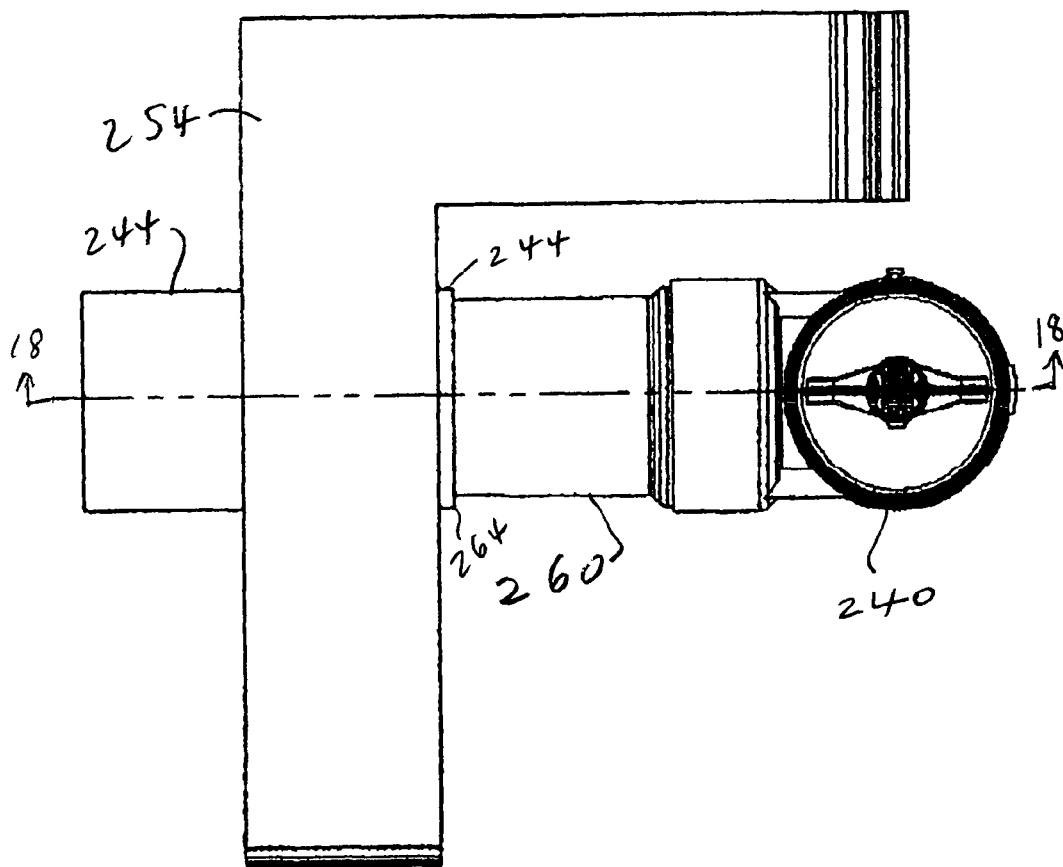


Fig. 17

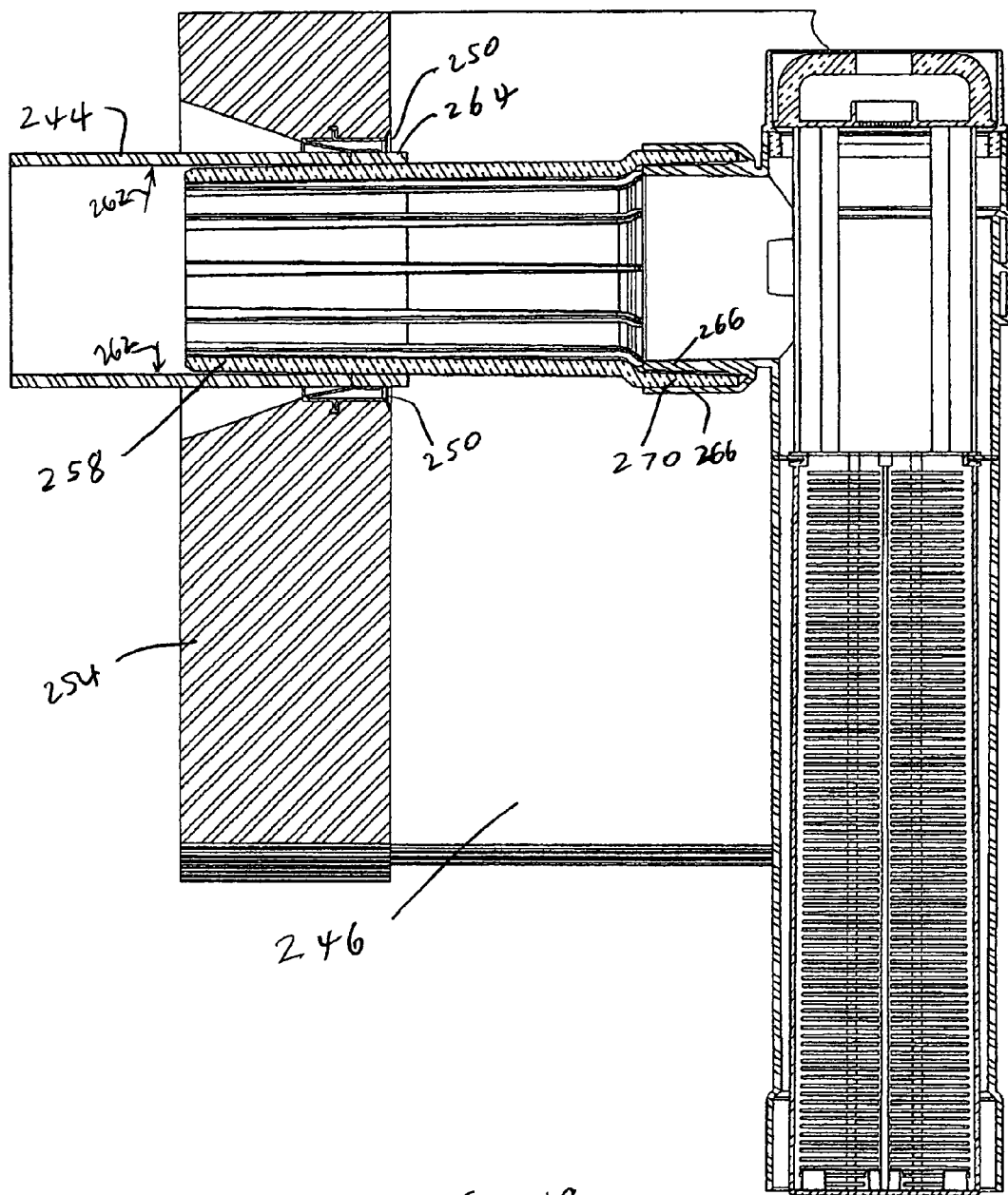
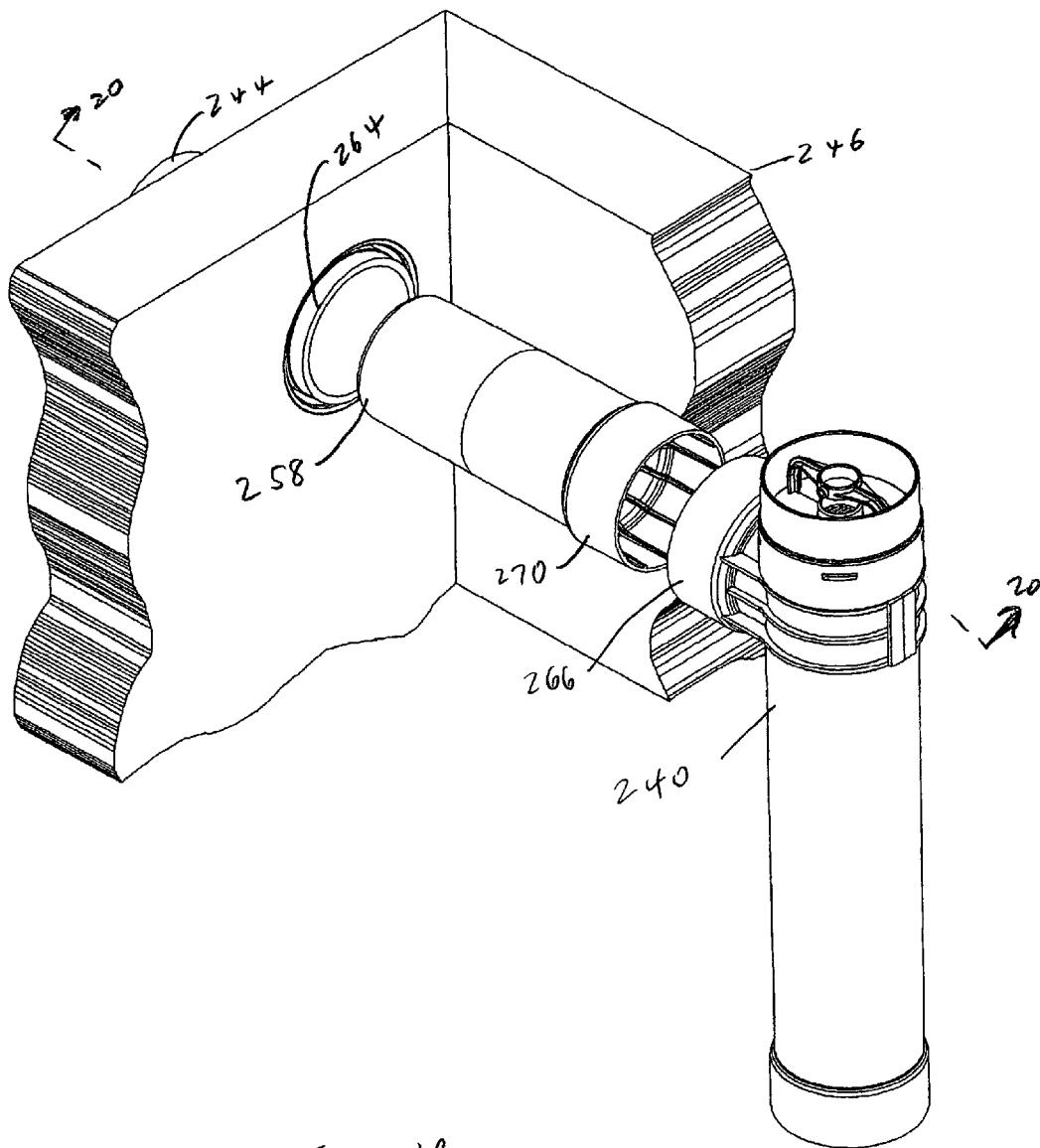
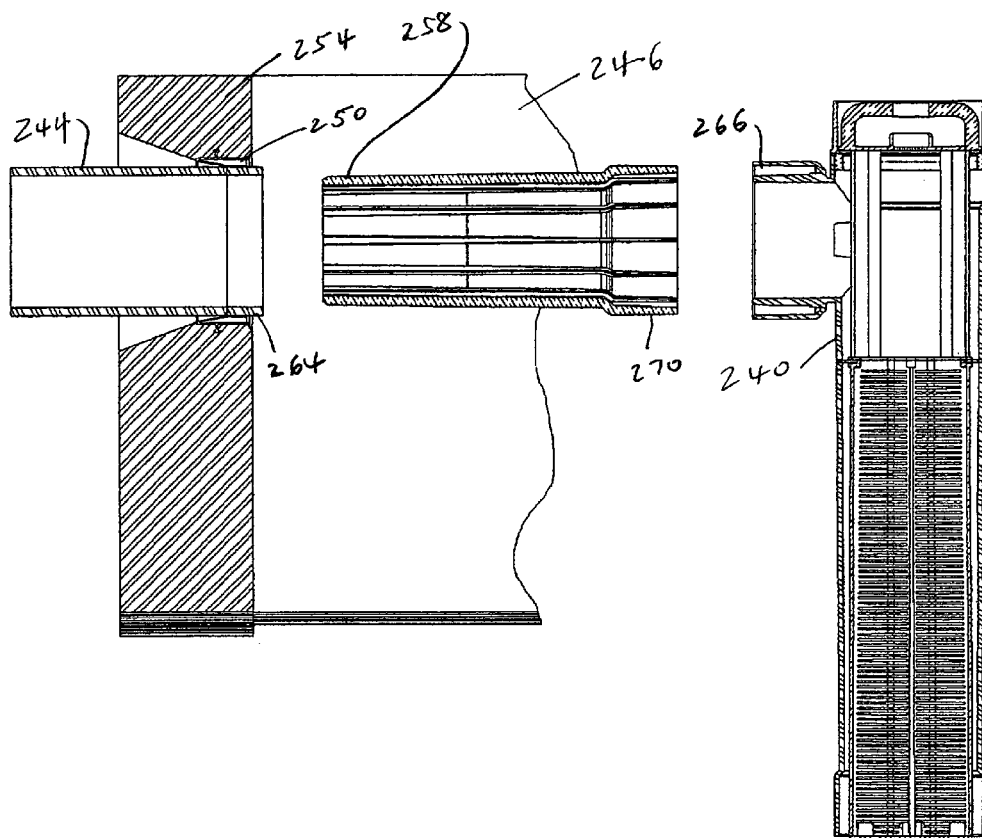
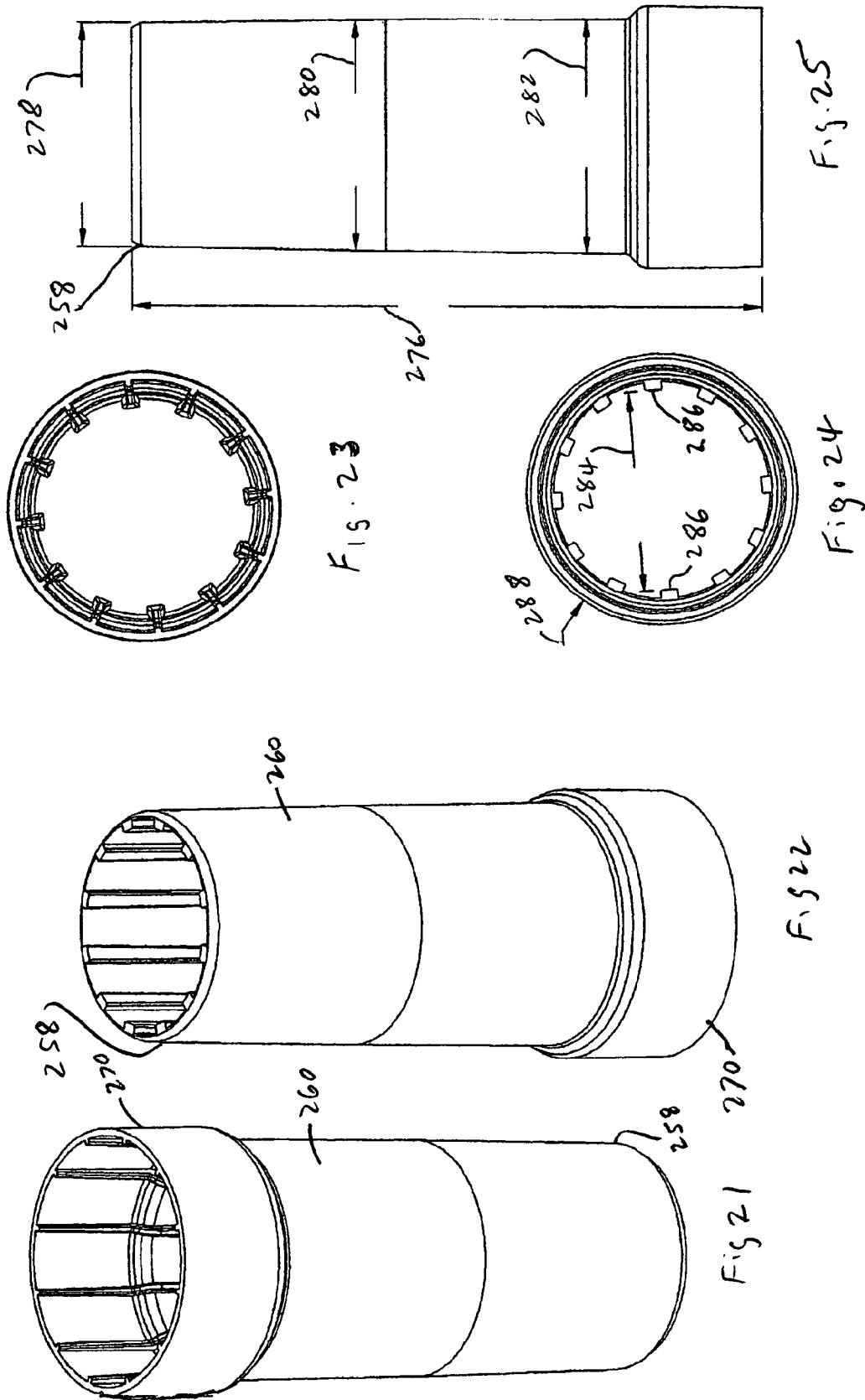


Fig. 18







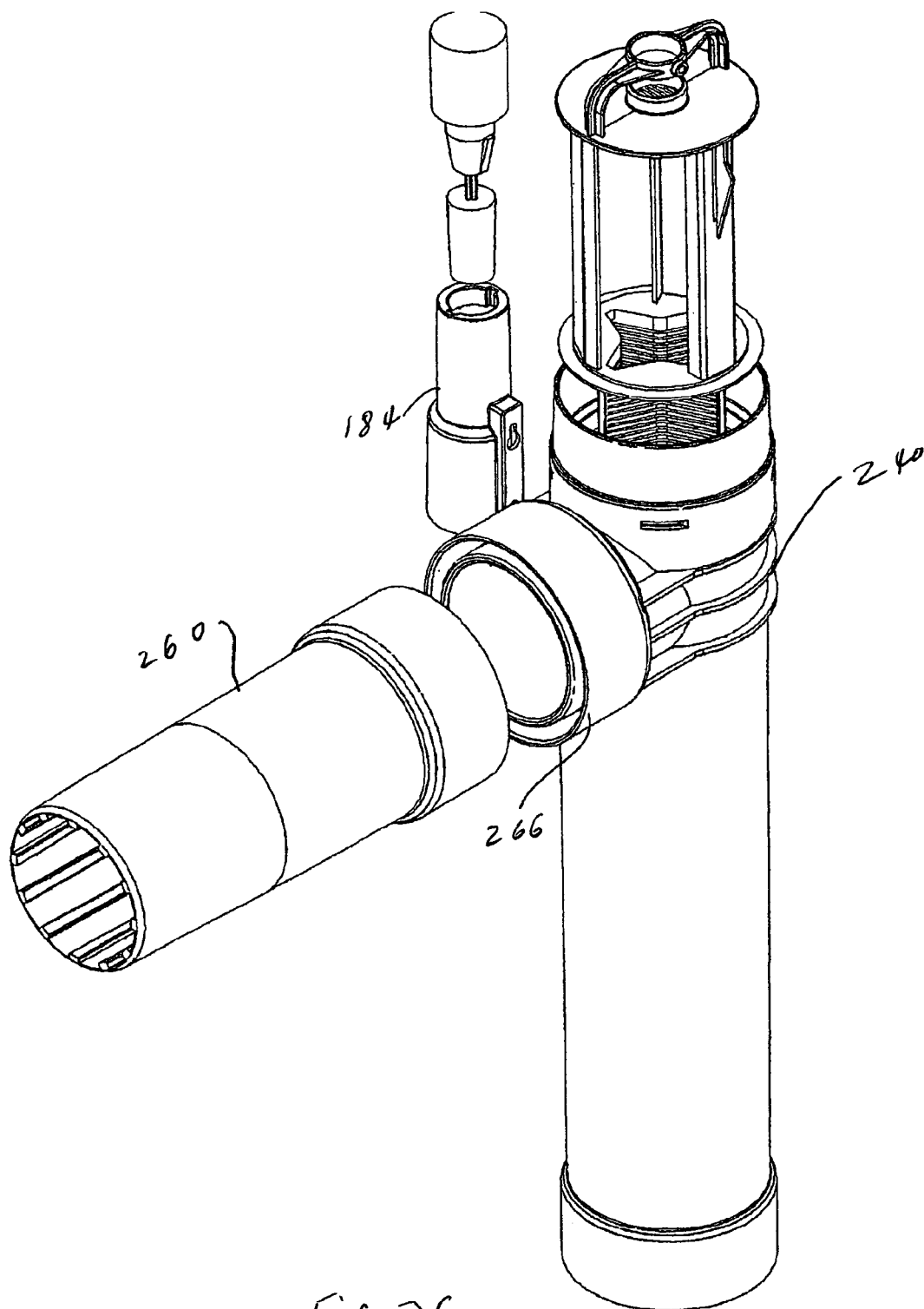


Fig. 26

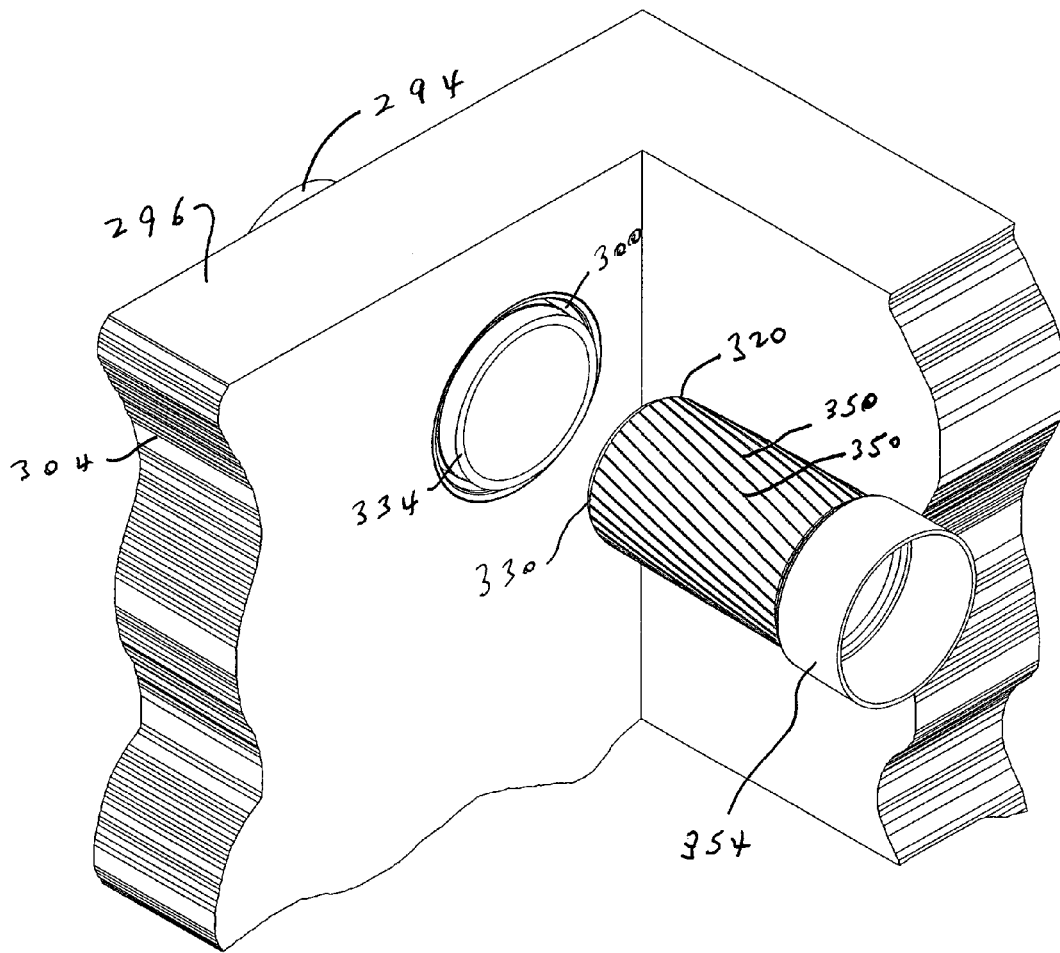


Fig. 27

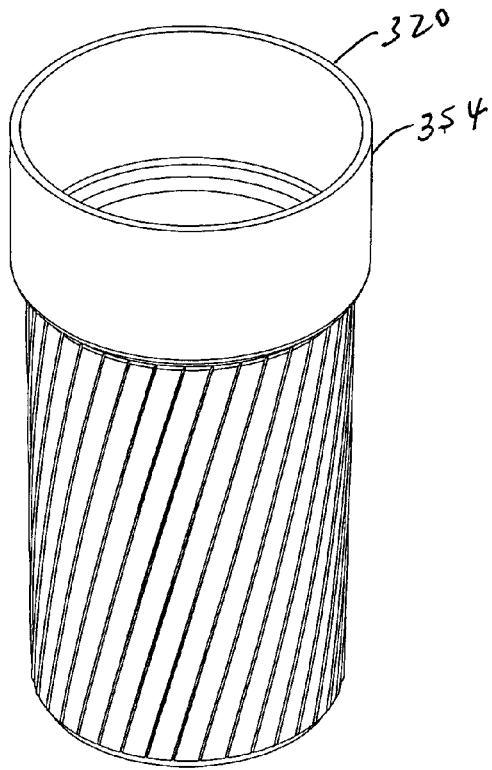


Fig. 28

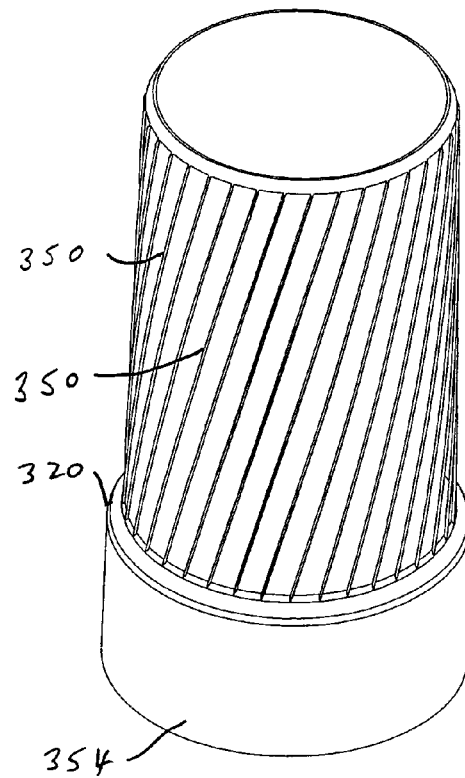
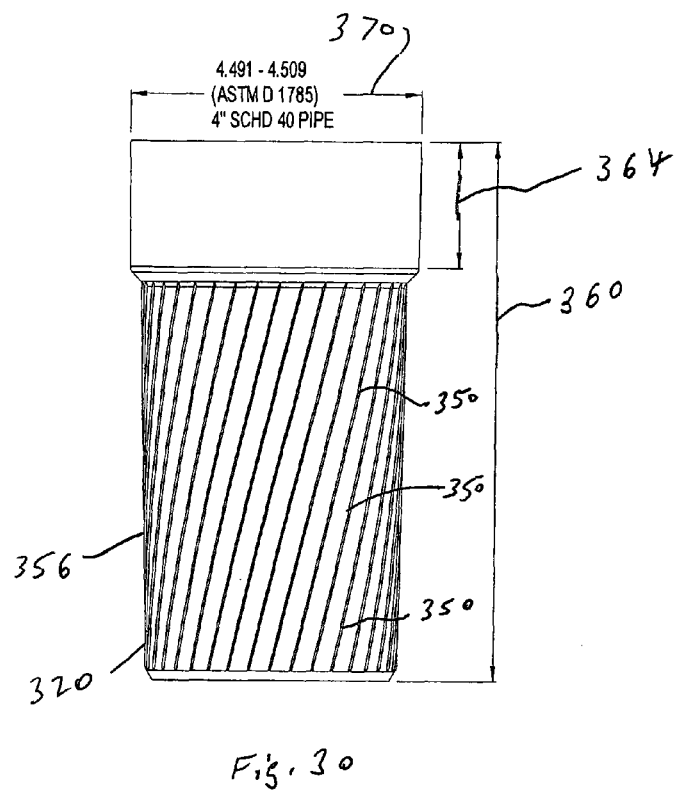
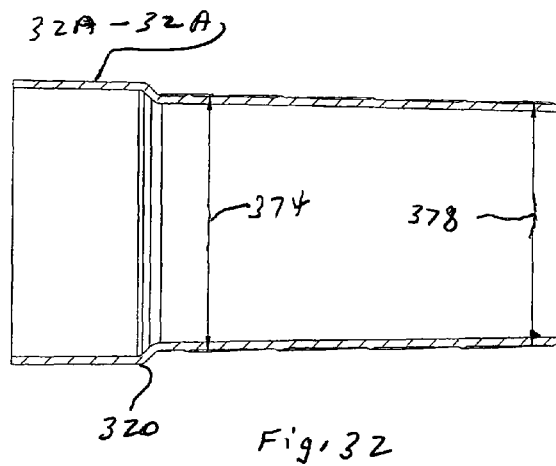
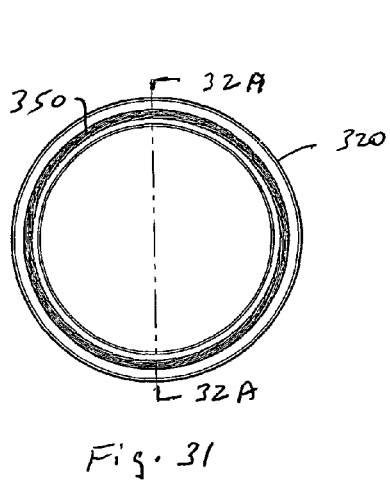


Fig. 29



**T-HOUSING FOR SEPTIC TANK**

This application claims the benefit of U.S. Provisional Application No. 60/545,099 filed Feb. 17, 2004.

**BACKGROUND OF THE INVENTION****1. Field of the Invention**

This invention pertains to a T-housing system for a septic tank outlet. More particularly the invention pertains to filter retention within a vertical portion of the T-housing, an adaptor for filter retention, and liquid level sensor mounting on the vertical portion.

**2. Description of the Prior Art**

The prior art is described below with respect to FIGS. 1-4.

Tank 20 receives waste 22 from home sinks, toilets, etc. through inlet pipe 24. The waste is digested in the tank so that solids 26 fall to the bottom and liquid exits outlet pipe 34 by flowing upward 28 in the center of filter cartridge 30 within T-housing 32.

In some filter designs the liquid flows upward over the outside of the filter, through the sides of the filter to the center of the filter and from there to the exit pipe. The direction of liquid flow through the sides of the filter has no bearing upon the invention.

Filter cartridge 30 is loaded into the T-housing by removing cover 38 that contains water level sensor 40, and pushing the cartridge down in vertical tube portion 46 of the T-housing by handle 47 until outwardly elastically biased finger 44 snaps outward into exit tube 48 of the T-housing so that the finger 44, latched into exit tube 48, prevents the cartridge from being forced upward and outward of portion 46 by buoyancy of the filter with entrained waste particles and upward flow of the exiting liquid. The filter has an arrow mark on upper plate 50 to indicate to the installer person which way to position the filter about vertical axis 54 so that finger 44 lines up with exit tube 48. It is difficult to line up the filter properly in the field when the upper plate is contaminated with soil, mud, etc. and is being moved down into a subterranean hole.

**SUMMARY OF THE INVENTION**

It is one object of the invention to provide a multidirectional latch for a snap-in filter that is received in the T-housing.

It is another object of the invention to provide a snap-on cover for the T-housing.

It is another object of the invention to provide a rotate and lock attachment for a liquid level alarm system on an external side of the T-housing.

It is another object to provide a linear lock attachment for a liquid level alarm system on an external side of the T-housing.

It is another object of the invention to provide an element for attaching a T-housing to a dirty outlet pipe of a septic tank U.S. Provisional Application Ser. No. 60/545,099 filed Feb. 17, 2004 is hereby incorporated herein by reference in its entirety.

In accordance with the invention a T-housing for a septic system tank includes a vertical first tube having a first end, a second end and an axis, an exit tube for filtered waste extending laterally from a side of the first tube between the first end and the second end, the first tube designed for receiving a filter cartridge having a top and a bottom, in the first tube by insertion of the cartridge through the first end,

the filter cartridge including outwardly resiliently biased means for catching on a surface that is transverse to the axis when the filter cartridge is in the first tube,

a first annular surface (76) extending radially inward from the first tube, spaced from the second tube and from the first end toward the second tube, facing toward the second end of the first tube,

the first annular surface being sufficiently continuous for receiving the resiliently biased means at any angle around a vertical axis of the first tube, for resisting vertical movement of the filter cartridge out of the first tube,

a second surface facing toward the first end, spaced from the first annular surface, extending radially inward from the first tube sufficiently for receiving a surface of the filter cartridge facing the second end when the filter cartridge is in the first tube and the first tube is receiving the resiliently biased means, for preventing movement of the second surface past the first annular surface. The first annular surface is preferably on a collar attached to the first tube. The second surface may be on the collar.

A T-housing for an outlet of a septic tank, the T-housing including:

a vertical first tube having a first end, a second end and an axis, an exit tube for filtered waste, extending laterally from a side of the first tube between the first end and the second end,

the first tube designed for receiving a filter cartridge having a top and a bottom, in the first tube by insertion of the cartridge through the first end,

means for sensing liquid level attached to an outer side of the vertical first tube,

a plurality of catches on the outer side of the vertical first tube, and

a slot designed for receiving the catches, extending along a length of the means for sensing, for attaching the means for sensing to the T-housing,

twist-lock means for attaching the means for sensing to the outer side of the vertical first tube.

In a T-housing mounted on an outlet pipe extending through a wall of a septic tank, the T-housing including:

a vertical first tube having a first end, a second end and an axis, an exit tube for filtered waste, extending laterally from a side of the first tube between the first end and the second end,

the first tube designed for receiving a filter cartridge having a top and a bottom in the first tube, by insertion of the cartridge through the first end,

a tapered pipe having a first end mounted in the exit tube and a second end mounted in the outlet pipe,

ribs extending longitudinally along a length of the tapered pipe, preferably the ribs being helical.

**BRIEF DESCRIPTION OF THE DRAWINGS**

In order that the invention be more fully comprehended, it will now be described, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 is a schematic perspective view of a prior art conventional T-housing outlet in a tank.

FIG. 2 is a perspective view of a prior art conventional filter designed for installation in a T-housing.

FIG. 3 is a schematic perspective view of a prior art conventional assembly of the filter of FIG. 2, mounted in the housing of FIG. 1. A handle at the top of the housing in FIG. 1 is replaced in FIG. 3 with an electrical overflow sensor and wire exiting therefrom.

FIG. 4 is a schematic perspective view of the prior art conventional latching of the filter latch arm of a filter into the tee of a T-housing.

3

FIG. 5 is a cross sectional view of a filter latch arm on a filter engaging a multidirectional latch collar of a T-housing according to the invention.

FIG. 6 is a top view of the T-housing and filter of FIG. 5.

FIG. 7 is a schematic cross section enlarged view of a filter latch arm of a filter engaging a multidirectional latch collar in another direction according to the invention.

FIG. 8 is a schematic perspective view of a filter latch, snap-on filter retention collar according to the invention.

FIG. 9 is a schematic perspective view of the filter latch, snap-on filter retention collar of FIG. 8, latched over the upper seal plate of a filter, according to the invention.

FIG. 10 is a schematic perspective view of a pair of catches disposed on the outer surface of a T-housing for mounting a liquid level alarm system on the outer surface of the T-housing according to the invention.

FIG. 11 is a schematic perspective view of the liquid level alarm system of FIG. 10, rotated to show the mounting slot for receiving the pair of catches, according to the invention.

FIG. 12 is a schematic perspective view of a pair of catches disposed on the outer surface of a T-housing for mounting a liquid level alarm system on the outer surface of the T-housing and a sensor according to the invention.

FIG. 13 is a schematic perspective view of the T-housing and liquid level alarm system of FIG. 12, rotated to show the mounting slot for receiving the pair of catches, according to the invention.

FIG. 14 is a schematic perspective view of the T-housing of FIG. 12 rotated to show an opposite side of the catches.

FIG. 15 is a schematic perspective view of the liquid level alarm system of FIG. 13, rotated to show an opposite side of the mounting slot.

FIG. 16 is a schematic perspective side view of a T-housing of the invention connected by a tapered pipe of the invention to a conventional outlet pipe mounted in a wall of a septic tank. The septic tank is shown in partial view.

FIG. 17 is a top view of the T-housing assembly of FIG. 16.

FIG. 18 is a cross section view of the T-housing assembly of FIG. 17 taken along 18-18.

FIG. 19 is a schematic perspective view of the T-housing assembly of FIG. 16 wherein the elements are separate before assembly.

FIG. 20 is a schematic cross section view of the T-housing assembly of FIG. 18 wherein the elements are separate before assembly.

FIG. 21 is a perspective view of a tapered pipe of the invention looking partially into an end that is adapted for attachment to the T-housing.

FIG. 22 is a perspective view of the tapered pipe of FIG. 21, looking partially into an end that is force fit by insertion into an outlet pipe of a septic tank.

FIG. 23 is an end view of the visible opening of the pipe of FIG. 21.

FIG. 24 is an end view of the visible opening of the pipe of FIG. 22.

FIG. 25 is a side view of the pipe of FIG. 21.

FIG. 26 is a perspective schematic exploded view of the T-housing, level sensor and tapered pipe of the invention.

FIG. 27 is a schematic perspective side view of a tapered pipe of the invention for mounting in a conventional outlet pipe mounted in a wall of a septic tank. The septic tank is shown in partial view. The tapered pipe is shown separate from the outlet pipe before assembly.

FIG. 28 is a perspective side view of the tapered pipe of FIG. 27 looking partially into an end that is adapted for attachment to the T-housing.

4

FIG. 29 is a perspective view of the tapered pipe of FIG. 28, looking partially into an end that is force fit by insertion into an outlet pipe of a septic tank.

FIG. 30 is a side view of the pipe of FIG. 29.

FIG. 31 is an end view of the pipe of FIG. 30.

FIG. 32 is a cross section view taken along 32A-32A of the pipe of FIG. 30.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

Before explaining the invention in detail, it is to be understood that the invention is not limited in its application to the detail of construction and arrangement of parts illustrated in the drawings since the invention is capable of other embodiments and of being practiced or carried out in various ways. It is also to be understood that the phraseology or terminology employed is for the purpose of description only and not of limitation.

Referring to the drawings:

In FIGS. 5 and 6, collar 80 is inserted into and fastened to vertical tube 78.

Finger 60 of filter 66 comprises resilient means for urging the finger radially outward. Preferably the finger is a resilient molded portion of the filter. Finger 60 is sprung radially outward above exit tube 68 of T-housing 70. The filter is prevented from moving upward and outward of vertical tube 78 by finger 60 contacting annular surface 76 that extends radially inward from vertical tube 78 of T-housing 70. Annular surface 76 is provided by collar 80 which extends downward into vertical tube 78.

When filter 66 is loaded into the T-housing, it is pushed downward until the installer person hears or feels the click of finger 60 springing radially outward past the bottom of collar 80.

In FIG. 5, the finger lines up with exit tube 68. The filter is prevented from moving further downward into exit tube 68 by upper plate 82 of the filter resting on the upper surface of radially inward depending shoulder 84 of collar 80.

When the filter is inserted at any angle about vertical axis 88, as for example in FIG. 7, the finger will conveniently spring radially outward under collar 80 even when the finger is not lined up vertically with exit tube 68.

The filter can be removed for cleaning or replacing by drawing it out manually with greater upward force than the filter would receive from the liquid in the tank.

In FIGS. 8 and 9, collar 98 snaps into vertical tube 102 of T-housing 104 by way of a plurality of resilient fingers 108 on collar 98 springing radially outward into a plurality of radially open slots 110 in tube 102.

When filter 120 is installed in T-housing 104 by inserting the filter downward into vertical tube 102, upper plate 116 of the filter passes the plurality of resilient fingers 114 which spring radially inward, snapping over the top of plate 116 so that they prevent the plate and filter from being forced upward and outward of vertical tube 102 by liquid in the tank. Downward movement of the plate is halted by the plate coming to rest on radially inward depending shoulder 122 on collar 98.

The filter can be removed for cleaning or replacing by drawing it out manually with greater upward force than the filter would receive from the liquid in the tank.

In FIGS. 10 and 11, vertical slot 144 on housing 140 of liquid level alarm system 148 comprising float 142 and transponder 143 that twist lock into the housing, is designed to receive horizontal stud or catch 152 when the housing is held horizontally and moved radially inward toward axis 154 and onto the catch.

When catch **152** is in the slot, the housing is rotated vertically so that axis **156** is parallel to axis **154**, and the lower portion of housing **140** is moved toward horizontal catch **160** until stud or catch **160** enters horizontal slot portion **146** of slot **144**.

Housing **140** is then slid downward until top end **162** of slot **144** rests on catch **152** which is locked in slot **144** so that catch **160** is also locked in slot **144**.

In FIGS. **12-15**, eye **180** on housing **184** of liquid level alarm system **188** comprising float **190** and transponder **192** is designed to receive upper catch **194** on T-housing **196**, and open ended **204** eye **208** is designed to receive lower catch **210** on the T-housing when housing **184** is held vertically and moved radially inward toward axis **216** of the T-housing vertical filter receiving tubular portion **218**, so that axis **220** of system **188** is parallel to axis **216**.

Housing **184** is then slid downward **186** until top end **222** of vertical slot **224** of eye **180** rests on catch **194** which is locked in eye **180** by slot **224**, so that catch **210** is locked in vertical slot **228** of lower eye **208**.

In FIGS. **16-18**, conventional generally cylindrical outlet pipe **244** extends through conventional rubber seal **250** that is cast into concrete wall **254** of a septic tank **246**. T-housing **240** of the invention is connected to outlet pipe **244** by pipe **260** of the invention.

In the prior art, the T-housing is attached to the outlet pipe by slipping T-housing outlet pipe joint **266** onto portion **264** of the outlet pipe **244** and gluing them together. It is difficult to make the attachment of joint **266** to portion **264** because portion **264** is short and often contaminated by dirt.

According to the invention, end **258** of pipe **260** is slipped into portion **264** and forced into portion **264** as far as pipe **260** will go. Although glue can be used, pipe **260** is tapered and the radial outward force **262** of the taper on portion **264** provides friction grip that, without a need for glue, prevents the pipes from parting.

End **270** of pipe **260** which is clean, is glued into joint **266**.

FIGS. **19** and **20** show pipes **244**, **260**, and joint **266** separated before installation of the T-housing in the septic tank.

Referring to FIGS. **21-25**, pipe **260** is preferably tapered at two different tapers to accommodate more than one diameter septic tank outlet pipe.

Preferably pipe **260** is made of ABS plastic although construction of the pipe is not limited to being ABS plastic. One example of a pipe **260** according to the invention is ABS, volume 20.14 cubic inches, weight 12 ounces, length **276** 10.500 inches, diameter **278** 3.875 inches, diameter **280** 4.017 inches, diameter **282** 4.087 inches, inner diameter **284** between ribs **286** 3.344 inches, diameter **288** 4.533 inches.

In FIG. **27**, conventional generally cylindrical outlet pipe **294** extends through conventional rubber seal **300** that is cast into concrete wall **304** of septic tank **296**. In the invention, pipe **310** of the invention is designed to connect a T-housing to outlet pipe **294**.

According to the invention, end **330** of pipe **320** is slipped into portion **334** of pipe **294** and forced into portion **334** as far as pipe **320** will go. Although glue can be used, pipe **320** is tapered and the radial outward force of the taper on portion **334** provides friction grip reinforced by helical ribs **350** that, without a need for glue, prevents the pipes from parting.

End **354** of pipe **320** is glued into a T-housing outlet joint.

Referring to FIGS. **28-32**, pipe **320** is preferably tapered at two different tapers to accommodate more than one diameter septic tank outlet pipe. Tapered diameter **354** provides a locking fit into the inner diameter of 4" pipe.

Pipe **320** is PVC, dimensions **360** 8.57", **364** 2.00", **370** (ASTM) D 1785) 4" SCHD 30 Pipe, **374** 4.125", **378** 3.875.

Although the present invention has been described with respect to details of certain embodiments thereof, it is not intended that such details be limitations upon the scope of the invention. It will be obvious to those skilled in the art that various modifications and substitutions may be made without departing from the spirit and scope of the invention as set forth in the following claims.

## DRAWING DESIGNATORS (INFORMAL LIST)

10	<b>20</b> tank
	<b>22</b> waste
	<b>24</b> pipe, inlet
	<b>26</b> solids
15	<b>28</b> upward, flow
	<b>30</b> filter cartridge
	<b>32</b> T-housing
	<b>34</b> pipe, outlet
	<b>38</b> cover
20	<b>40</b> sensor
	<b>44</b> finger
	<b>46</b> vertical tube
	<b>47</b> handle
	<b>48</b> exit tube
25	<b>50</b> plate, upper
	<b>54</b> axis
	<b>60</b> finger
	<b>66</b> filter
	<b>68</b> exit tube
30	<b>70</b> T-housing
	<b>76</b> annular surface
	<b>78</b> tube, vertical
	<b>80</b> collar
	<b>82</b> upper plate
35	<b>84</b> shoulder
	<b>88</b> axis
	<b>98</b> collar
	<b>102</b> vertical tube
	<b>104</b> T-housing
40	<b>108</b> finger
	<b>110</b> slot
	<b>120</b> filter
	<b>116</b> upper plate
	<b>114</b> finger
45	<b>122</b> shoulder
	<b>140</b> housing
	<b>142</b> float
	<b>143</b> transponder
	<b>144</b> slot, vertical
50	<b>146</b> slot, horizontal
	<b>148</b> alarm system
	<b>152</b> catch, horizontal
	<b>154</b> axis
	<b>156</b> axis
55	<b>160</b> catch, horizontal
	<b>162</b> top end
	<b>180</b> eye
	<b>184</b> housing of alarm system <b>188</b>
	<b>186</b> downward, direction arrow
60	<b>188</b> alarm system
	<b>190</b> float
	<b>192</b> transponder
	<b>194</b> catch, upper
	<b>196</b> T-housing
65	<b>204</b> open end
	<b>208</b> eye
	<b>210</b> catch, lower

216 axis, T-housing  
 218 vertical filter receiving tubular portion  
 220 axis of alarm system 188  
 222 top end of slot 224  
 224 slot, vertical  
 228 slot, vertical  
 240 T-housing  
 244 outlet pipe of septic tank 246  
 246 septic tank  
 250 seal, rubber  
 254 wall of septic tank  
 258 end of pipe 260  
 260 pipe of the invention  
 262 force, radial outward, arrows  
 264 portion of outlet pipe 244  
 266 joint, outlet pipe, T-housing  
 270 end of pipe 260  
 276 length  
 278 diameter  
 280 diameter  
 282 diameter  
 284 diameter  
 286 ribs  
 288 diameter  
 294 outlet pipe  
 296 septic tank  
 300 rubber seal  
 304 concrete wall  
 310 pipe  
 320 pipe  
 330 end of pipe 320  
 334 portion  
 350 helical ribs

354 end of pipe 320  
 356 tapered diameter  
 360 dimension 8.57"  
 364 dimension 2.00"  
 5 370 (ASTM D 1785) 4" SCHD 30 Pipe  
 374 4.125"  
 378 3.875"  
 What is claimed is:  
 1. A septic tank outflow system, comprising:  
 10 a T-housing outlet joint connected to a filter disposed in a septic tank system;  
 a pipe fitting having a first open end joined with said T-housing outlet joint and a second open end;  
 said first open end of said pipe fitting having a first diameter  
 15 and said second open end of said pipe fitting having a second diameter that is smaller than said first diameter;  
 said pipe fitting having a body extending from said first open end of said pipe fitting to said second open end of said pipe fitting and having a cross-sectional diameter that is tapered in a single direction from said first diameter to said second diameter;  
 20 said body of said pipe fitting further having longitudinally extending helical raised ribs extending upwardly from surfaces of said body; and  
 25 said body of said pipe fitting being friction fit within an outlet pipe of said septic tank system thereby joining said T-housing outlet joint with said outlet pipe.  
 2. The septic tank outflow system according to claim 1, wherein said T-housing outlet joint includes a wall having an annular recess and wherein said first open end is joined with  
 30 said T-housing outlet joint in said annular recess with an adhesive material.

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